

High-resolution?

AN ASSESSMENT OF COMPUTATIONAL RESOURCES REQUIRED FOR OCEAN CIRCULATION MODELLING

Ad Hoc Committee on
Computing Resources and Facilities
for Ocean Circulation Modelling
Ocean Sciences Board
Commission on Physical Sciences, Mathematics,
and Resources
National Research Council
NATIONAL ACADEMY PRESS
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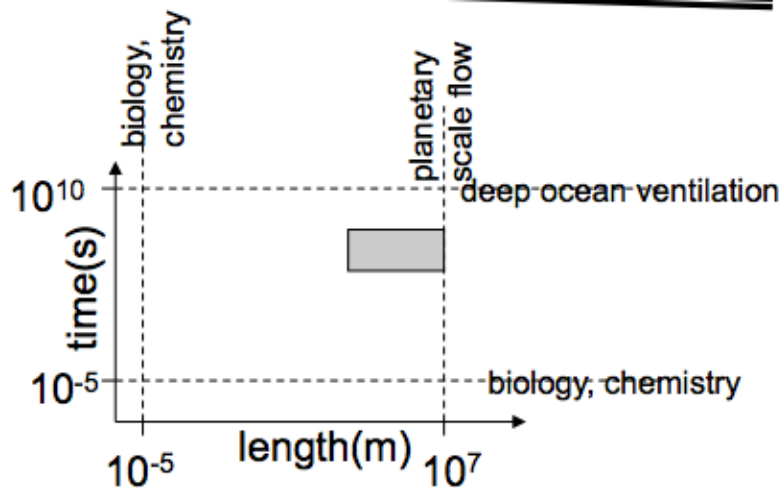
Table 1. Present, projected and desirable resource needs for ocean circulation modelling (units: cpu hours/year on a class six system)

(1a) Usage at all Installations				
		Present	Projected	Desirable
OGCM/Climate		260	1167	2587
EGCM		309	643	1222
Regional/Process		615	1368	2462
Data/other		324	926	1332
TOTAL		1508	4104	7603

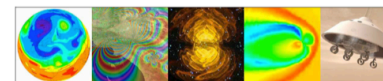
Good news - 1984 community needs (7603 hours @ 50 Mflop/s) can now be met by 1 PC (or Mac)!

1984 High-resolution

dt = 25 years



x processes, uncertainty



NASA Science Mission Directorate Computational Modeling Capabilities Workshop

The Inn & Conference Center
University of Maryland University College
College Park, MD
July 29-30, 2008

Final Report

2008 High-resolution

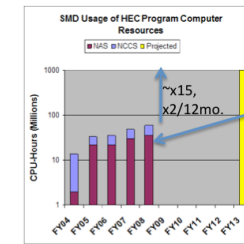
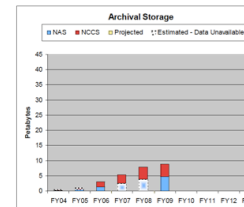


Figure 2: Comparison of historical SMD usage to projected requirement in 2013.

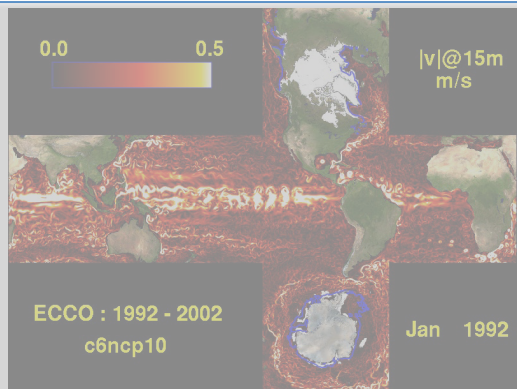


~10⁶ 1984,
x2/15mo.

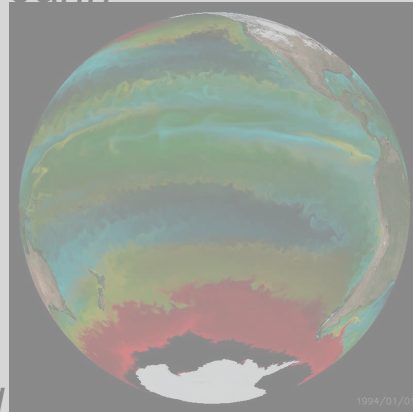
Includes atmos,
solid and ocean.
Ocean is significant
fraction

x2/12mo. is a challenge.
cf Moore curve (18mo)
However, interesting
architecture developments
offer some opportunities.

Beyond 18km cube

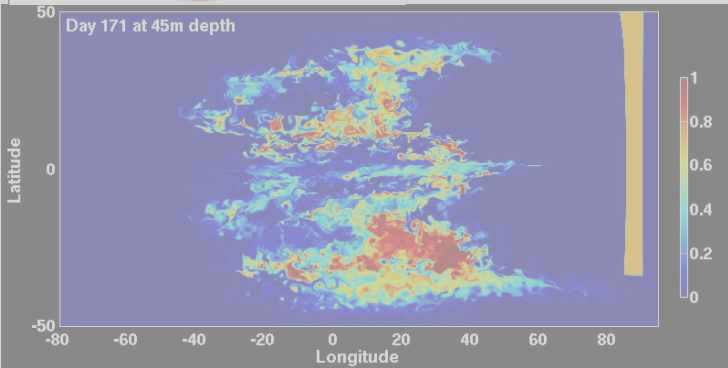
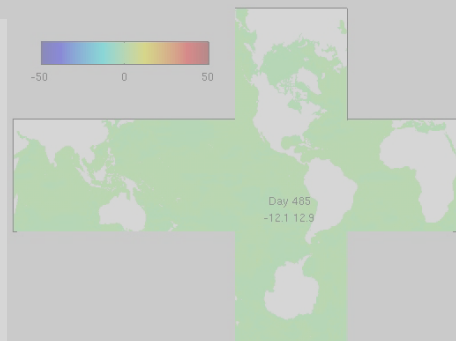
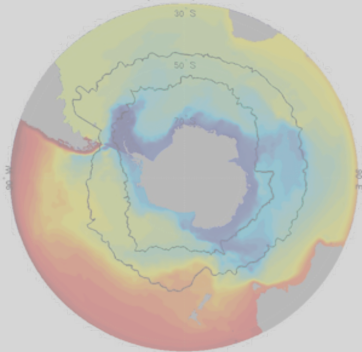


Jahn

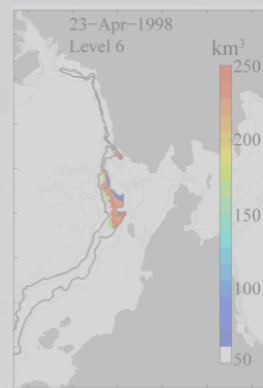


Zhang

Mazloff



Tulloch



Nguyen

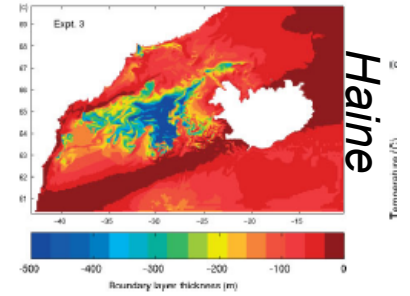
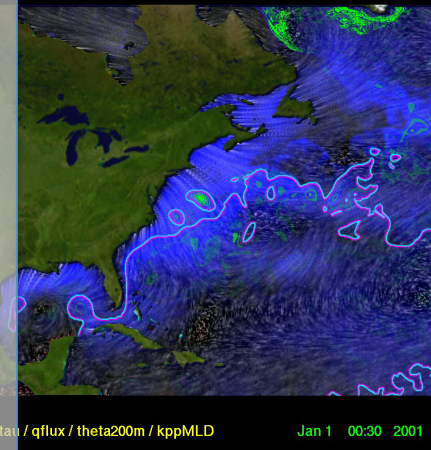
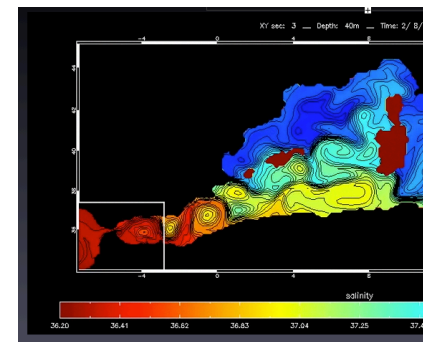
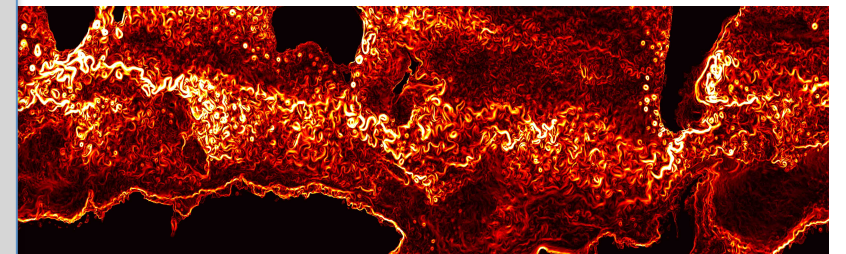
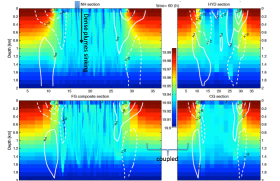


Figure 6. Oceanic boundary-layer thickness (m) at 0300 UTC on 9 March 2007: (a) Expt. 1, (b) Expt. 2, and (c) Expt. 3.

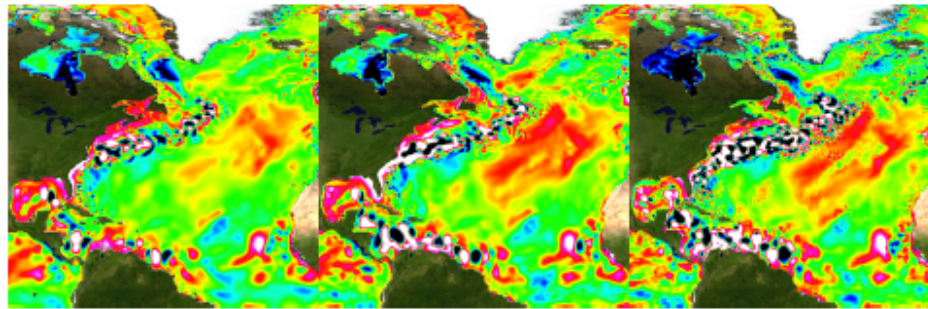
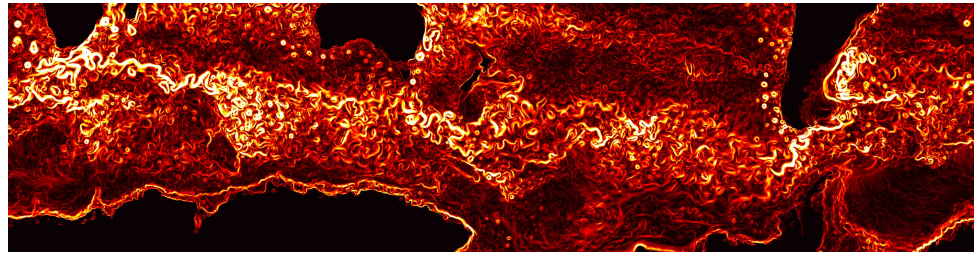
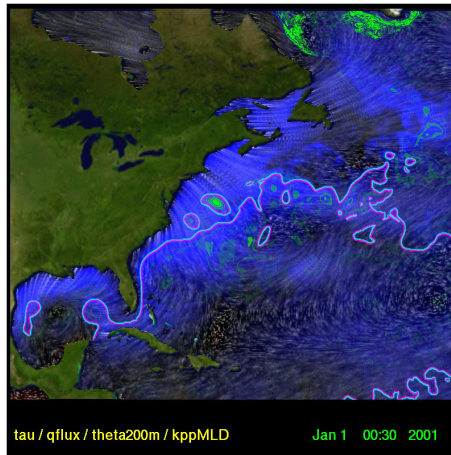


Sannino

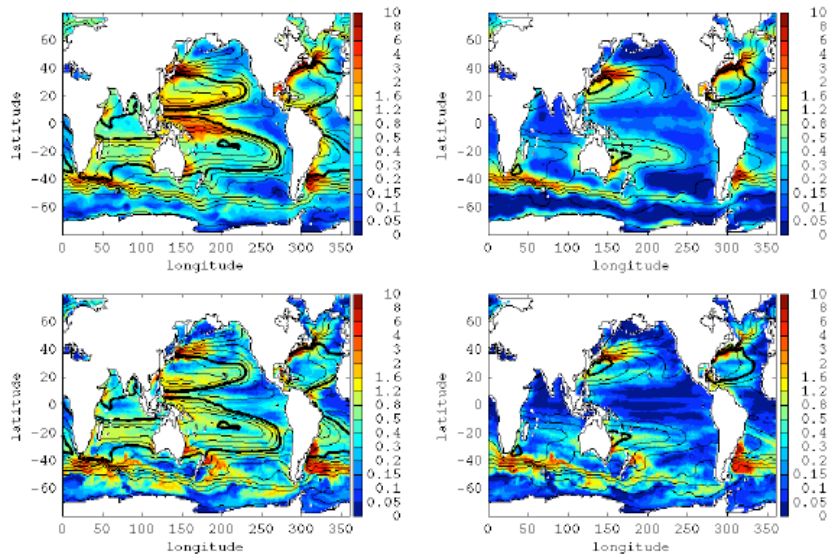


$$\Delta_h = 18\text{km}$$

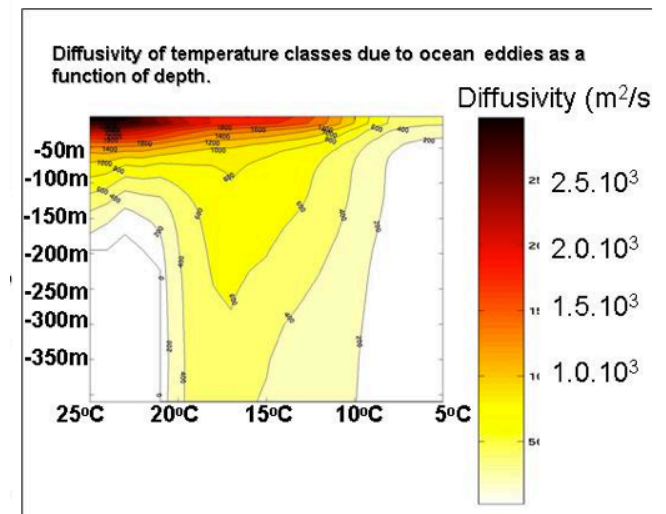
$$\Delta_h = 5\text{km}$$



Experimental global calcs at $<10\text{km}$



Comparing to Argo
variability



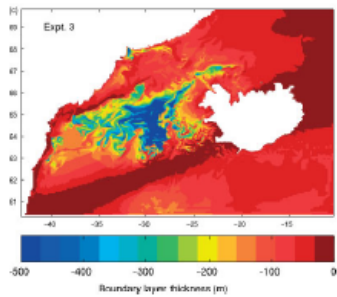
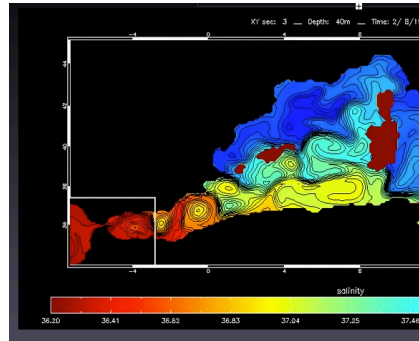
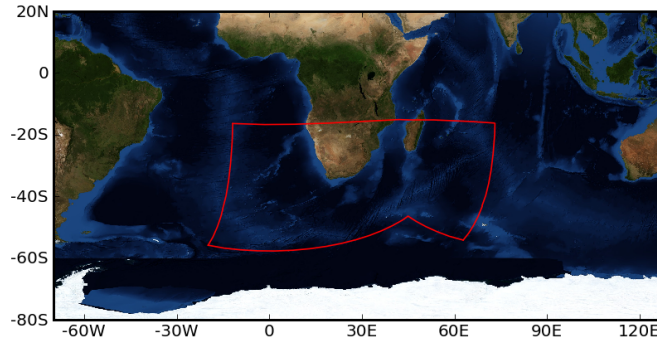


Figure 6. Oceanic boundary-layer thickness (m) at 0300 UTC on 9 March 2007: (a) Expt. 1, (b) Expt. 2, and (c) Expt. 3.

Haine, QJRMS



Sannino, Oce. Mod



Jahn

Future plans – PAVE (petascale arctic, atlantic, antarctic virtual experiment) building towards 1-2km resolving Arctic, Atlantic, Antarctic single model – can we get toward explicit representation of mixed layer (some, PRM), overflows, straits, salt plume etc...?

Experimental testbed for multi-scale, sub-model based parameterizations.

